NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

INCH-POUND

MIL-PRF-49465A
AMENDMENT 2
25 January 1994
SUPERSEDING
AMENDMENT 1
10 OCTOBER 1991

PERFORMANCE SPECIFICATION

RESISTORS, FIXED, METAL ELEMENT (POWER TYPE)
(VERY LOW RESISTANCE VALUES),
GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-R-49465A, dated 20 February 1990, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 1

1.2.1, line 2: Delete "basic number" and substitute "basic".

PAGE 6

* Add the following paragraphs:

"3.4.1.2.1 Solder dip (retinning) leads. The manufacturer may solder dip/retin the leads of product supplied to this specification provided the solder dip/retin process has been approved by the qualifying activity.

3.4.1.2.2 Qualifying activity approval. Approval of the solder dip/retin process will be based on one of the following options:

a. When the original lead finish was hot solder dip lead finish 52 of MIL-STD-1276 (NOTE: The 200 microinch maximum thickness is not applicable). The manufacturer shall use the same solder dip process for retinning as is used in the original manufacture of the product.

b. When the lead originally qualified was not hot solder dip lead finish 52 of MIL-STD-1276 as prescribed in a., approval for the process to be for the solder dip shall be based on the following test procedure:

(1) Thirty samples of any resistance value for each style and lead finish are subjected to the manufacturing's solder dip process. Following the solder dip process, the resistors are subjected to the dc resistance test and other group A electricals. No defects are allowed.

(2) Ten of the thirty samples are then subjected to the solderability test. No defects are allowed.

(3) The remaining 20 samples are subjected to the resistance to solder heat test followed by the moisture resistance test.

3.4.1.2.3 Solder dip/retinning options. The manufacturer may solder dip/retin as follows:

a. After the group A tests: Following the solder dip/retinning process, the electrical measurements required in group A, subgroup 1 shall be repeated on the lot. The group A, subgroup 1, lot rejection criteria shall be used. Following this test, the manufacturer shall submit the lot to the group A solderability test as specified in 4.7.3.

b. As a corrective action if the lot fails the group A solderability test."

PAGE 7

* FIGURE 1, delete and substitute:

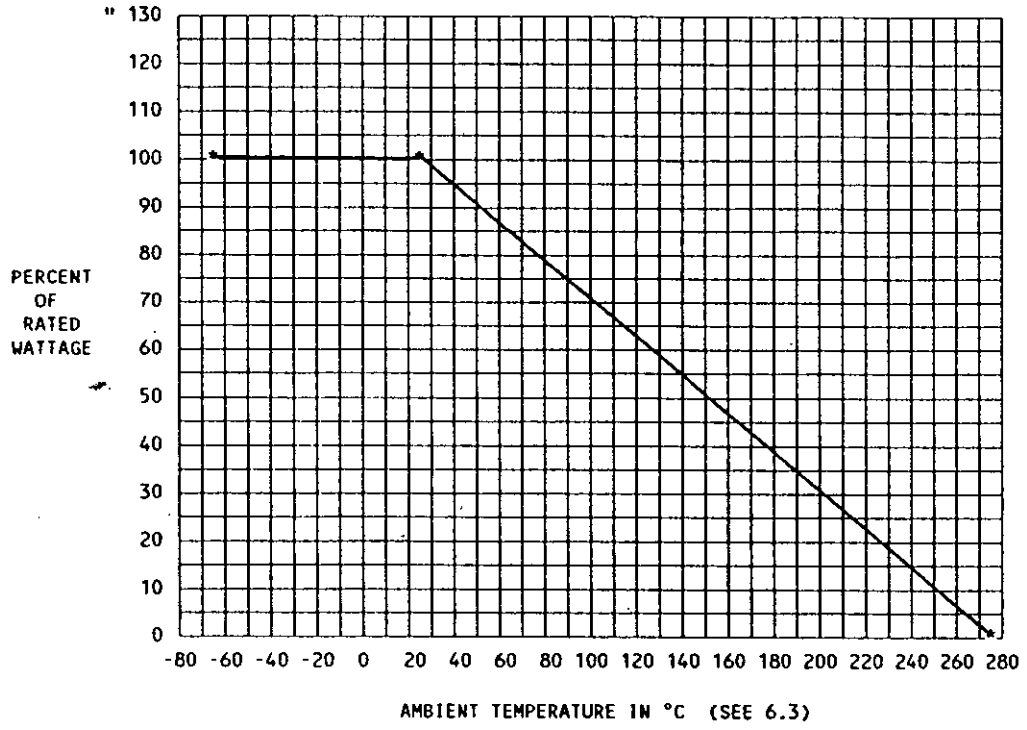

FIGURE 1. Derating curve for high ambient temperatures. "

PAGE 9

3.21, line 3: Delete "1.0 percent" and substitute "2.0 percent".

3.22, line 2: Delete "1.0" and substitute "2.0".

PAGE 11

* 4.5a, delete and substitute:

"a. A summary of the results of the tests performed for inspection of product for delivery (group A), indicating, as a minimum, the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for."

* 4.5b, delete and substitute:

"b. A summary of the results of tests performed for periodic inspection (group B), including the number and mode of failures. The summary shall include results of all periodic tests performed and completed during the 6-month period. If the summary of the tests indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list."

* 4.6.1, delete and substitute:

"4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection."

* 4.6.1.1, delete and substitute:

"4.6.1.1 Inspection lot. An inspection lot, as far as practical, shall include resistors of any style within a given group shown in table VII without regard to resistance value or resistance tolerance, produced under essentially uniform conditions and offered for inspection at one time. Resistors which differ in design, construction, materials, and terminal type shall not be included in one lot."

* 4.6.1.2, delete and substitute:

"4.6.1.2 Production lot. A production lot consists of parts manufactured from the same basic raw materials, processed under the same specifications and procedures, and produced with the same equipment. Each production lot of parts should be a group identified by a common manufacturing record through all significant manufacturing operations."

* 4.6.1.2.1, delete in its entirety.

* 4.6.1.2.2, delete in its entirety

* TABLE VI, delete and substitute:

"TABLE VI. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of samples
Subgroup 1 DC resistance	 3.8	 4.7.2	 100 percent inspection
Subgroup 2 Visual and mechanical inspection Terminals Markings	 3.1, 3.3 to 3.4.1.1, 3.4.1.3, and 3.24 3.4.1.2 3.24, 3.24.1	 4.7.1	 See table VII
Subgroup 3 Solderability	 3.9	 4.7.3	 6

"

* TABLE VII, delete and substitute:

"TABLE VII. Group A sampling plan.

Lot size	Subgroup 2 sample size
2 to 13	100%
14 to 125	13
126 to 150	13
151 to 280	20
281 to 500	29
501 to 1200	34
1201 to 3200	42
3201 to 10000	50
10001 to 35000	60
35001 to 150000	74
150001 to 500000	90
500001 and over	102

"

* 4.6.1.3, delete and substitute:

"4.6.1.3 Group A inspection. Group A inspection shall consist of the inspections specified in table VI, and shall be made on the same set of sample units, in the order shown."

* 4.6.1.3.1, delete and substitute:

"4.6.1.3.1 Sampling plan. Subgroup 1 tests shall be performed on a production lot basis on 100 percent of the producted supplied under this specification. Units that are out of resistance tolerance, or which experience a change in resistance greater than that permitted for the tests of this subgroup shall be removed from the lot. Lots having more than 10-percent total rejects, due to exceeding the specified resistance change limit shall not be furnished on contracts."

* 4.6.1.3.2, delete and substitute:

"4.6.1.3.2 Subgroup 2. A sample of parts from each inspection lot shall be randomly selected in accordance with table VII, if one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected in accordance with table VII, if one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification."

* 4.6.1.3.3, delete and substitute the following paragraphs:

"4.6.1.3.3 Subgroup 3 (solderability).

4.6.1.3.3.1 Sampling plan. Six samples shall be selected randomly from each inspection lot and subjected to the subgroup 3 solderability test. If there are one or more defects, the lot shall be considered to have failed.

4.6.1.3.3.2 Rejected lots. In the event of one or more defects, the inspection lot is rejected. The manufacturer may use one of the following options to rework the lot:

a. Each production lot that was used to form the failed inspection lot shall be individually submitted to the solderability test as required 4.7.3. Production lots that pass the solderability test are available for shipment. Production lots failing the solderability test can be reworked only if submitted to the solder dip procedure in b.

b. The manufacturer submits the failed lot to a 100 percent solder dip using an approved solder dip process in accordance with 3.4.1.4. Following the solder dip the electrical measurements required in group a, subgroup 1 tests shall be repeated on 100 percent of the lot. Lot acceptance for the electrical measurements shall be as for the subgroup 1 tests. Six additional samples shall then be selected and subjected to the solderability test with zero defects allowed. If the lot fails this solderability test the lot may be rework a second time and be retested. If the lot fails the second reworked, the lot shall be considered rejected and shall not be furnished against the requirements of this specification."

* 4.6.2, delete and substitute:

"4.6.2 Periodic inspection. Periodic inspection shall consist of group B. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.2.1.3), delivery of products which have passed group A shall not be delayed pending the results of these periodic inspections."

* 4.6.2.1, delete and substitute:

"4.6.2.1 Group B inspection. Group B inspection shall consist of the tests specified in table VIII, in the order shown. The specified number of sample units shall be selected from inspections lots that have been subjected to and have passed group A inspections. A separate sample shall be selected from lots as defined in 4.6.1.1 for each enclosure material and element technology. Group B samples shall be representative of production."

* 4.6.2.1.1.1, delete and substitute:

"4.6.1.1.1 Semiannually (subgroup 1 and 2). Every 6 months the specified number of sample units shall be subjected to the examination and test of table VIII. The samples shall be selected from a lot as defined in 4.6.1.1, and where possible shall be representative of the styles included in the lot. The manufacturer should select samples so that a maximum variety of styles produced are tested. A separate set of samples shall be tested for each enclosure material."

* 4.6.2.1.1.2, delete "Quarterly and semiannually" and substitute "Annually (subgroup 1, and 2)".

* 4.6.2.1.1.3, add "(subgroup 3)" after Annually.

* 4.6.2.1.2, delete and substitute:

"4.6.2.1.2 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on the contract or purchase order."

* TABLE VIII, delete and substitute:

"TABLE VIII. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of sample units to be inspected	Number of failure allowed
Semiannually Subgroup 1				
Resistance to solvents	3.10	4.7.4	4	0
Subgroup 2				
Thermal shock	3.11	4.7.5		
Resistance temperature characteristic	3.12	4.7.6		
Low temperature storage	3.13	4.7.7	6 highest	
Short-time overload	3.14	4.7.8	10	1
Dielectric withstanding voltage	3.15	4.7.9	4 lowest	
Insulation resistance	3.16	4.7.10		
Moisture resistance	3.17	4.7.11		
Terminal strength	3.18	4.7.12		
Annually Subgroup 1			10 highest	
Life	3.21	4.7.15	20 10 lowest	1
Subgroup 2				
Thermal shock	3.11	4.7.5	15 highest	
Shock	3.19	4.7.13	30	1
Vibration	3.20	4.7.14	15 lowest	
Subgroup 3			15 highest	
High temperature exposure	3.22	4.7.17	30 15 lowest	1

"

* 4.6.2.1.3, delete and substitute:

"4.6.2.1.3 Noncompliance. If a sample fails to pass group B inspection, the manufacturer shall immediately notify the qualifying activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same materials or processes, and which are considered subject to the same failures. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity has been taken. After the corrective action has been taken, group B inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Group A inspection may be reinstituted; however final acceptance and shipment shall be withheld until the group B reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity."

PAGE 17

* 4.7.2a, delete and substitute:

"a. Measuring apparatus. Different types of measuring test equipment (multimeters, bridges, or equivalent) are permitted to be used on the initial and final readings of readings of this test, provided the equipment is the same style, model, or it can be shown that the performance of the equipment is equivalent or better."

PAGE 18

TABLE IX, For quality conformance inspection, add: "2/". Also, in table, add the following:

"275

125
25 1/
-55
---
25 1/"

TABLE IX, at bottom of table , add the following:

"2/ At the option of the manufacturer, the reverse sequence may be as specified."

PAGE 22

4.7.13a, line 1: Delete "approximate" and substitute "appropriate".

PAGE 23

4.7.15f, line 5: Delete "during other than" and substitute "other than during".

PAGE 28

TABLE X, bottom of table: Delete "two" and substitute "two-".

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the notations and relationship to the last previous amendment.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 85

Review activities:
Army - AR, MI
Navy - AS, CG, MC, OS
Air Force - 19, 99
DLA - ES

Preparing activity:
Army - ER

Agent:
DLA - ES

(Project 5905-1371)